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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ROBERT C.U. YU,
ANTHONY M. HORGAN, SATCHIDANAND MISHRA,
DONALD C. VON HOENE, BING R. HSIEH,
EDWARD F. GRABOWSKI, RICHARD L. POST,
and KATHLEEN M. CARMICHAEL

Appeal 2008-1999
Application 09/683,329
Technology Center 1700

Decided: November 26, 2008

Before BRADLEY R. GARRIS, CHARLES F. WARREN, and THOMAS A. WALTZ, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

DECISION ON APPEAL

Applicants appeal to the Board from the decision of the Primary Examiner finally rejecting claims 1 through 23 in the Office Action mailed

June 21, 2004. 35 U.S.C. §§ 6 and 134(a) (2002); 37 C.F.R. § 41.31(a) (September 2004).

We affirm the decision of the Primary Examiner.

Claim 1 illustrates Appellants' invention of a seamless flexible electrostatographic imaging member belt fabrication method, and is representative of the claims on appeal:

1. A seamless flexible electrostatographic imaging member belt fabrication method comprising:

providing a flexible substrate support sheet;

placing a first pattern template on a first portion of the support sheet;

producing first desired features on the first portion of the substrate support sheet, including removing material from the substrate support sheet with first emissions, the first pattern template preventing the first emissions from striking the support sheet and thus preventing removal of material from under the first pattern template;

placing a second pattern template on a second portion of the support sheet, the second pattern template being complementary to the first pattern template;

producing second desired features on the second portion of the substrate support sheet complementary to the first desired features, including removing material from the substrate support sheet with second emissions, the second pattern template preventing the second emissions from striking the support sheet and thus preventing removal of material from under the second pattern template;

overlapping the first and second desired features;

bonding the first desired pattern with the second desired pattern to produce a seamed belt having substantially no added seam thickness; and

applying at least one coating to the seamed belt.

The Examiner relies upon the evidence in these references (Supp. Ans. 3): [1]

Schlueter, Jr. (Schlueter '193)	5,549,193	Aug. 27, 1996
Yu	5,688,355	Nov. 18, 1997
Schlueter, Jr. (Schlueter '301)	5,942,301	Aug. 24, 1999
Schlueter, Jr. (Schlueter '974)	5,997,974	Dec. 7, 1999

Appellants request review of the ground of rejection of appealed claims 1 through 23 under 35 U.S.C. § 103(a) over Schlueter '193 in view of Yu, Schlueter '974, and Schlueter '301 advanced on appeal by the Examiner. Ans. 4; App. Br. 8.

Appellants argue each of independent claims 1, 10, 16, and 21, with the dependent claims standing or falling based thereon. App. Br. 9, 14, 19, and 22. Thus, we decide this appeal based on claims 1, 10, 16, and 21. 37 C.F.R. § 41.37(c)(1)(vii) (September 2004).

The threshold issue in this appeal is whether Appellants have shown that Schlueter '301 would not have disclosed to one of ordinary skill in this art that a pattern template can be used to laser cut a flexible substrate support sheet, and if not, the issue is whether Appellants have shown that the combined teachings of Schlueter '193, Yu, Schlueter '974, and Schlueter '301 to one of ordinary skill in this art would not have disclosed a seamless flexible electrostatographic imaging member belt fabrication method as claimed.

[1] We consider these documents: Appeal Brief filed November 22, 2004; Supplemental Examiner's Answer mailed June 1, 2007; Reply Brief filed February 15, 2005; and Supplemental Reply Brief filed February 17, 2006.

We determine the plain language of representative independent claim 1 specifies, in pertinent part, a method of fabricating a seamless flexible belt comprising, among other things, the use of two pattern templates to make respective first and second "desired features" in end portions of a flexible substrate support sheet with at least removal of material from the substrate with respective first and second "emissions," which can be a laser beam. The templates are "on" the substrate and prevent the emissions from striking the support sheet thereunder. *See* Spec., e.g., 20, ¶ 0066. The features in the respective portions are overlapped and bonded together, forming a "seamed belt having substantially no added seam thickness," which structure is coated to form a "seamless" belt. *See* Spec., e.g., 12, ¶ 0040. This is illustrated in Specification Fig. 6 wherein first portion 24 with first feature 38 of belt 10 overlaps second portion 26 with second feature 38 to form the seamed belt. *See* Spec. 16-17, ¶ 0057.

The pattern template of claim 1 is different than the "mask" specified in dependent claim 2 which shapes the emissions by blocking a part of the beam. The mask is thus positioned above the flexible substrate support sheet as illustrated with mask 80, 81 in laser beam 82 in Specification Figure 7. *See* Spec. 17-18, ¶ 0060; Remand entered October 27, 2005, in Appeal 2005-2480 in this application at pp. 4-6; Supp. Ans. 5-6.

We further determine the term "substantially" in the claim phrase "substantially no added seam thickness" is one of degree for which the Specification does not provide either a definition or some standard of measuring that degree. *See* Spec., e.g., 12, ¶ 0040. *See, e.g., Seattle Box Co., Inc. v. Industrial Crating & Packing, Inc.*, 731 F.2d 818, 826 (Fed. Cir.

1984) ("Definiteness problems often arise when words of degree are used in a claim. That some claim language may not be precise, however, does not automatically render a claim invalid. When a word of degree is used . . . [it] must [be determined] whether the patent's specification provides some standard for measuring that degree."); *cf. In re Marosi*, 710 F.2d 799, 802-03 (Fed. Cir. 1983) (general guidelines and examples in the specification were sufficient to permit one of ordinary skill in the art to "draw the line between unavoidable impurities in starting materials and essential ingredients" with respect to the claim phrase "silicon dioxide sources that is essentially free of alkali metal"). We are of the opinion that, in the context of the disclosure in the Specification, the term "substantially" would have its ordinary, dictionary meaning of "largely but not wholly." *See*, *e.g.*, *York Prods., Inc. v. Central Tractor Farm & Family Ctr.*, 99 F.3d 1568, 1572-73, (Fed. Cir. 1996) ("In this case, the patent discloses no novel uses of claim words. Ordinarily, therefore, 'substantially' means 'considerable in . . . extent,' *American Heritage Dictionary Second College Edition* 1213 (2d ed. 1982), or 'largely but not wholly that which is specified,' *Webster's Ninth New Collegiate Dictionary* 1176 (9th ed. 1983)."). Thus, we determine the claim phrase permits claim 1 to encompass methods in which the "seam" of the "seamed" belt formed by overlapping and bonding the features in the respective portions produces largely but not wholly "no added seam thickness" with respect to the height differential between the seam and the belt.

Our claim interpretation determinations apply to the same and similar claim language appearing in independent claims 10, 16, and 21.

We find Schlueter '193 evinces it was known in the prior art that flexible electrostatographic imaging seamed belts formed by butting or overlapping two ends of belt material result in a height differential between the seam and the belt of 0.010 inches, that is, 254 micrometers, or more, and that a seam height differential of less than 0.001 inches, that is, 25.4 micrometers, is desirable. Schlueter '193, col. 1, l. 60 to col. 2, l. 27. We further find Schlueter '193 would have disclosed to one of ordinary skill in this art a method of forming a flexible electrostatographic imaging seamed belt by joining two ends of a sheet of material, wherein each end has an overlapping, butting, interlocking joint pattern with complimentary joining features which can be of any geometry that results in an overlapping seam with relatively low seam height differential. Schlueter '193, e.g., col. 2, l. 53 to col. 3, l. 8, col. 4, l. 55 to col. 5, l. 13, col. 5, ll. 29-63, and Fig. 4. "The pattern of the overlapping, butting and interlocking joint may be formed in any suitable manner such as by . . . die cutting or laser cutting with . . . lasers such as CO_2 laser or excimer laser generating a beam of sufficient width and intensity . . . ." Schlueter '193 col. 4, ll. 47-53.

We find Yu evinces it was known in the prior art that flexible electrostatographic imaging member seamed belts formed by overlapping two ends of belt material with ultrasonic welding, typically are about 1.6 times thicker in the seam region, "e.g., about 188 micrometers versus 116 micrometers," because of the overlap and the splashing resulting from the ultrasonic welding. Yu, col. 1, l. 63 to col. 2, l. 31. We further find Yu would have disclosed to one of ordinary skill in this art a method of forming a flexible electrostatographic imaging member seamed belt by overlapping

the ends of a flexible sheet, wherein the ends have complimentary features formed therein which mate and are fused to form the seam. The complimentary features are formed by masked excimer laser beam as illustrated in Yu Figure 5 in which original excimer laser beam 70 is shaped by masking plate 72 to form laser beam 64 which displaces a thin layer of material 61 from sheet 62, exposing substrate layer 82. Thus, "the formation of a seam splash which normally occurs during ultrasonic welding" is avoided. Yu, e.g., col. 7, l. 63 to col. 8, l. 22, col. 16, ll. 58-63, col. 17, l. 35 to col. 18, l. 30, and col. 18, l. 49 to col. 19, l. 53. Yu discloses "[t]he welded seam belt . . . preferably has a seam thickness of less than about 120 percent but greater than about 103 percent of the total thickness of the original sheet." Yu col. 17, ll. 41-44. Yu discloses a seam thickness "thinner than 103 percent will not absorb sufficient mechanical pounding energy from the ultrasonic horn action during scan welding process, and therefore, produces weak seam strength due to incomplete polymer fusing at the overlap." Yu col. 17, ll. 47-51.

Yu illustrates the flexible belts formed by the disclosed process in Figure 6B, showing "an excellent overlapping seam morphology having a thickness that only slightly exceeds the original thickness of imaging member 88," and in Figure 7B, showing mechanically interlocked, overlapped end regions 84, 86 fused to form a seam with "substantially no splashing, and minimum seam thickness." Yu, e.g., col. 20, ll. 19-55, and col. 21, ll. 36-55. Yu further illustrates the flexible belt of Example V which has a seam "thickness of about 110 percent of the original imaging member

thickness and exhibited no visible splashing/flashing." Yu col. 26, ll. 20-51, and Table I.

We find Appellants state in the Specification that Yu discloses a method of fabricating an electrostatographic imaging member seamed belt "utilizing excimer laser ablation technique to remove precision amount of materials from . . . two opposite ends of a . . . sheet prior to overlapping the two opposite ends and ultrasonic welding the overlap into a welded seam . . . thus [obtaining] a welded seam of little added thickness and reduced amount of seam splashing formations." Spec. 6, ¶ 0022.

We find Schlueter '301 would have disclosed to one of ordinary skill in this art a method of forming a flexible seamed belt by interlocking the complimentary, puzzle cut matting elements on the ends of a sheet of material, and filling the space between the interlocked matting elements with an adhesive to obtain a seam "with substantially no thickness differential between the seam and the rest of the belt." Schlueter '301, e.g., col. 2, l. 52 to col., 3, l. 3, and Fig. 1. "The puzzle cut pattern for the matting elements may be formed according to any conventional shaping technique, such as by die cutting or laser cutting with . . . a CO_2 or excimer laser generating a beam of sufficient width and intensity . . . ." Schlueter '301 col. 3, ll. 39-44. In Schlueter '301 Table 1, the "Forming/Cutting" to "Cut preform for parallel edges" and "Cut first end in puzzle shape" has "Control Point" of "Use template." Schlueter '301 col. 11, ll. 49-53.

We find Schlueter '974 evinces it was known in the prior art that flexible electrostatographic imaging seamed belts formed by butting or overlapping two ends of belt material "provide a bump or other discontinuity

in the belt surface" resulting in a height differential between the seam and the belt of 0.010 inches or more, and that a seam height differential of less than 0.001 inches is desirable. Schlueter '974, col. 1, l. 56 to col. 2, l. 21. We further find Schlueter '974 would have disclosed to one of ordinary skill in this art a method of forming a flexible electrostatographic imaging seamed belt by interlocking the complimentary, puzzle cut matting elements on the ends of a sheet of material, and filling the space between the interlocked matting elements with an adhesive to obtain a seam without "any substantial thickness differential between the seam" and the rest of the belt. An undercoating layer is applied "to the flexible substrate and the seam such that the belt surface, including the seam, is substantially smooth." Schlueter '974, e.g., col. 3, ll. 41-53. Schlueter '974 discloses that the undercoated seamed belt is "mechanically . . . substantially equivalent in performance to a seamless belt." Schlueter '974, e.g., col. 4, ll. 16-28. "The puzzle cut pattern for the matting elements may be formed according to any conventional shaping technique, such as by die cutting or laser cutting with . . . a CO_2 or excimer laser generating a beam of sufficient width and intensity . . . ." Schlueter '974 col. 6, ll. 61-66.

We considered the record as a whole in light of Appellants' contentions, and are of the opinion that Appellants have not successfully rebutted the Examiner's prima facie case of obviousness. Appellants submit essentially the same contentions with respect to each of independent claims 1, 10, 16, and 21 in the Appeal Brief at pages 9-27, and further submit additional argument not directed to a specific claim. Reply Br. 1-4; Supp.

Reply Br. 1-2. Thus, we consider Appellants' position with respect to these claims individually to the extent argued in the Briefs.

Appellants argue Schlueter '301 does not teach one of ordinary skill in this art how to use a template, including "placing a template on a substrate" as claimed, and "provides no guidance as to how the template is used to form the puzzle cut shapes described therein" and "to form features that can be overlapped" as claimed. App. Br., e.g., 13; Supp. Reply Br. 1-2. Appellants further argue the reference does not suggest the template prevents emissions from striking the support sheet under the template. App. Br., e.g., 13. The Examiner argues one of ordinary skill in this art would have recognized that a template is used to obtain the desired geometric shape with the laser without removing material under the template. Supp. Ans. 7-8 and 14-15. The Examiner further argues that this person would recognize that different templates can be used to obtain complimentary shapes in the ends of the flexible sheet such that the ends can be overlapped in forming the seamed belt. Ans. 15-16.

We are of the view Appellants have not shown that Schlueter '301 would not have disclosed to one of ordinary skill in this art that a pattern template can be used to laser cut a flexible substrate support sheet. App. Br., e.g., 13 and 22; Supp. Reply Br. 1-2. We determine the Schlueter references and Yu establish that one of ordinary skill in this art is armed with knowledge of laser cutting complimentary mating and overlapping geometric shapes in the ends of flexible sheets in forming seamed belts, including the use of masks to shape the laser beam in forming the desired geometric shape shown by Yu. As the Examiner argues, this person would

have recognized from Schlueter '301 that a template is used to control the shape of the complimentary ends of the flexible sheet which must mate to form the seamless belt as taught in the reference. This person would further recognize the template would thus control the material removed in laser cutting the flexible sheet to obtain that geometry by shielding the flexible sheet from the laser when the template is placed "on" (e.g., claim 1) or "over" (e.g., claim 16) the flexible sheet. In this respect, it is well settled that a reference stands for all of the specific teachings thereof as well as the inferences one of ordinary skill in this art would have reasonably been expected to draw therefrom, *see In re Fritch*, 972 F.2d 1260, 1264-65 (Fed. Cir. 1992); *In re Preda*, 401 F.2d 825, 826 (CCPA 1968), presuming skill on the part of this person. *In re Sovish*, 769 F.2d 738, 743 (Fed. Cir. 1985). Appellants' mere contentions that Schlueter '301 would not have provided guidance to one of ordinary skill in this art to use the templates do not establish why this person would not have used the templates of Schlueter '301 in the manner argued by the Examiner.

Appellants contend the combined teachings of Schlueter '193, Yu, Schlueter '974, and Schlueter '301 do not disclose a seamless flexible electrostatographic imaging member belt fabrication method as claimed. In this respect, Appellants contend the methods of Schlueter '193 and Yu fabricate seamed belts with "significant added belt thickness" in the seam, and "Yu does not teach or suggest using the method described therein to form a seamed belt having substantially no added seam thickness" as claimed. App. Br., e.g., 10, citing, among other things, Yu Figs. 6B and 7B. The Examiner points out Yu's electrostatographic imaging member seamed

belts illustrated in Figures 6B and 7B "clearly have substantially no added seam thickness," and Appellants disclose that Yu's belts have "a welded seam of little added thickness." Supp. Ans. 13, citing Spec. ¶ 0022. The Examiner argues that both Schlueter '193 and Yu teach the disadvantages of a high seam height differential and the advantages of a low seam height differential, motivating one of ordinary skill in this art to laser ablate the ends of the sheet to obtain the desired degree of seam height differential, including "substantially no thickness added" as claimed. Supp. Ans. 13-14.

Appellants respond that "seams described in Yu clearly have little added thickness compared to what the present application refers to as a 'typical flexible imaging member' formed by overlapping ends of a sheet, which is indicated to be 'about 1.6 times thicker in the seam region than elsewhere.'" Reply Br. 1, citing Spec. ¶ 0012. Thus, Appellants argue the "recitation of 'little added thickness' is [not] equivalent to" the claim limitation "a seamed belt having substantially no added seam thickness." Reply Br. 2. Appellants contend Yu teaches away from a seam height differential of less than 103 percent in disclosing that a seam height differential less than 103 percent will produce a weak seam during the seam welding process. Reply Br. 2.

The difficulty with Appellants' position is that the claimed limitation "a seamed belt having substantially no added seam thickness," as we interpreted this language above (*see above* pp. 4-5), does not preclude the seam height differentials falling with the range of 103 to 120 percent disclosed by Yu or the seam height differential of 110 percent illustrated in Yu's Example V. Indeed, both Schlueter '193 and Yu evince it was desired

in the art to make a seam with a low seam height differential and Yu discloses this can be done using a masked excimer laser which, among other things, does not result in seam splashing which contributes to seam thickness, thus resulting in Yu's disclosed seam height differential range illustrated by seams of overlapped sheet ends having "little added thickness."

Appellants further contend Schlueter '974 teaches away from overlapping sheet ends to form a seam because the seam height differential would lead to performance failures, and thus there would have been no motivation to combine the step of coating the seamed belt to make a seamless belt of Schlueter '974 with the processes of forming an overlapped seamed belt of Schlueter '193 and Yu. App. Br., e.g., 11-12; Reply Br. 3-4. The Examiner argues that the combined teachings of the applied references overcome the seam height differential problem known in the art, including coating an overlapped seamed belt to form a seamless belt. Supp. Ans. 16-17.

We agree with the Examiner that the combined teachings of Schlueter '193, Yu, Schlueter '974, and Schlueter '301 would have disclosed to one of ordinary skill in this art that overlapped seamed belts can be formed with processes resulting in little seam height differential as taught by Schlueter '193 and Yu which can be coated to obtain a seamless belt as taught by Schlueter '974. Indeed, Schlueter '974 evinces the same problem of large seam height differentials known in the prior art as evinced by Schlueter '193 and Yu, and Yu discloses a solution to the problem which can be applied to Schlueter '193 by one of ordinary skill in this art. Thus, Schlueter '974 does

not teach away from following Yu's process. *See, e.g., In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004) (prior art "disclosure does not criticize, discredit, or otherwise discourage the solution claimed").

Furthermore, we determine one of ordinary skill in this art would have combined Schlueter '974 with Schlueter '193, Yu, and Schlueter '301 because these references involve seamed belts to which this person can apply the coating of Schlueter '794. *See, e.g., KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1739 (2007) (a patent claiming a combination of elements known in the prior art is obvious if the improvement is no more than the predictable use of the prior art elements according to their established functions); *In re Kahn*, 441 F.3d 977, 985-88 (Fed. Cir. 2006); *In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (("[T]he test [for obviousness] is what the combined teachings of the references would have suggested to those of ordinary skill in the art."); *Sovish*, 769 F.2d at 743 (skill is presumed on the part of one of ordinary skill in the art); *In re Bozek*, 416 F.2d 1385, 1390 (CCPA 1969) ("Having established that this knowledge was in the art, the examiner could then properly rely, as put forth by the solicitor, on a conclusion of obviousness 'from common knowledge and common sense of the person of ordinary skill in the art without any specific hint or suggestion in a particular reference.'"); *see also In re O'Farrell*, 853 F.2d 894, 903-04 (Fed. Cir. 1988) ("For obviousness under § 103, all that is required is a reasonable expectation of success." (citations omitted)).

Thus, we are of the opinion Appellants have not shown that the combined teachings of Schlueter '193, Yu, Schlueter '974, and Schlueter '301 would not have disclosed to one of ordinary skill in this art a seamless

flexible electrostatographic imaging member belt fabrication method as claimed.

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of obviousness found in the combined teachings of Schlueter '193, Yu, Schlueter '974, and Schlueter '301 with Appellants' countervailing evidence of and argument for nonobviousness and conclude that the claimed invention encompassed by appealed claims 1 through 23 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

The Primary Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

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Application 09/683,329

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